

5 CLAIMS

WHAT IS CLAIMED IS:

1. An isolated nucleic acid molecule comprising a polynucleotide having a nucleotide sequence at least 99.8% identical to a sequence selected from the group consisting of:
- 10 (a) a polynucleotide fragment of SEQ ID NO:1 or a polynucleotide fragment of the cDNA sequence included in ATCC Deposit No: PTA-2966, which is hybridizable to SEQ ID NO1;
- (b) a polynucleotide encoding a polypeptide fragment of SEQ ID NO:2 or a polypeptide fragment encoded by the cDNA sequence included in ATCC Deposit No:
- 15 PTA-2966, which is hybridizable to SEQ ID NO:1;
- (c) a polynucleotide encoding a polypeptide domain of SEQ ID NO:2 or a polypeptide domain encoded by the cDNA sequence included in ATCC Deposit No: PTA-2966, which is hybridizable to SEQ ID NO:1;
- (d) a polynucleotide encoding a polypeptide epitope of SEQ ID NO:2 or a
- 20 polypeptide epitope encoded by the cDNA sequence included in ATCC Deposit No: PTA-2966, which is hybridizable to SEQ ID NO:1;
- (e) a polynucleotide encoding a polypeptide of SEQ ID NO:2 or the cDNA sequence included in ATCC Deposit No: PTA-2966, which is hybridizable to SEQ ID NO:1, having potassium channel beta subunit activity;
- 25 (f) a polynucleotide which is a variant of SEQ ID NO:1;
- (g) a polynucleotide which is an allelic variant of SEQ ID NO:1;
- (h) an isolated polynucleotide comprising nucleotides 518 to 1798 of SEQ ID NO:1, wherein said nucleotides encode a polypeptide corresponding to amino acids 2 to 428 of SEQ ID NO:2 minus the start codon;
- 30 (i) an isolated polynucleotide comprising nucleotides 515 to 1798 of SEQ ID NO:1, wherein said nucleotides encode a polypeptide corresponding to amino acids 1 to 428 of SEQ ID NO:2 including the start codon;
- (j) a polynucleotide which represents the complimentary sequence (antisense) of SEQ ID NO:1; and
- 35 (k) a polynucleotide capable of hybridizing under stringent conditions to any one of the polynucleotides specified in (a)-(j), wherein said polynucleotide does

5 not hybridize under stringent conditions to a nucleic acid molecule having a nucleotide sequence of only A residues or of only T residues.

2. The isolated nucleic acid molecule of claim 1, wherein the polynucleotide fragment comprises a nucleotide sequence encoding a human potassium channel beta subunit protein.

10 3. A recombinant vector comprising the isolated nucleic acid molecule of claim 1.

4. A recombinant host cell comprising the vector sequences of claim 3.

5. An isolated polypeptide comprising an amino acid sequence at least 99.6% identical to a sequence selected from the group consisting of:

15 (a) a polypeptide fragment of SEQ ID NO:2 or the encoded sequence included in ATCC Deposit No: PTA-2966;

(b) a polypeptide fragment of SEQ ID NO:2 or the encoded sequence included in ATCC Deposit No: PTA-2966, having potassium channel beta subunit activity;

20 (c) a polypeptide domain of SEQ ID NO:2 or the encoded sequence included in ATCC Deposit No: PTA-2966;

(d) a polypeptide epitope of SEQ ID NO:2 or the encoded sequence included in ATCC Deposit No: PTA-2966;

(e) a full length protein of SEQ ID NO:2 or the encoded sequence included in ATCC Deposit No: PTA-2966;

25 (f) a variant of SEQ ID NO:2;

(g) an allelic variant of SEQ ID NO:2;

(h) a species homologue of SEQ ID NO:2;

30 (i) a polypeptide comprising amino acids 2 to 428 of SEQ ID NO:2, wherein said amino acids 2 to 428 comprise a polypeptide of SEQ ID NO:2 minus the start methionine;

(j) a polypeptide comprising amino acids 1 to 428 of SEQ ID NO:2; and

(k) a polypeptide encoded by the cDNA contained in ATCC Deposit No. PTA-2966.

35 6. The isolated polypeptide of claim 5, wherein the full length protein comprises sequential amino acid deletions from either the C-terminus or the N-terminus.

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- 5 7. An isolated antibody that binds specifically to the isolated polypeptide of claim 5.
8. A recombinant host cell that expresses the isolated polypeptide of claim 5.
9. A method of making an isolated polypeptide comprising:
 - 10 (a) culturing the recombinant host cell of claim 8 under conditions such that said polypeptide is expressed; and
 - (b) recovering said polypeptide.
10. The polypeptide produced by claim 9.
11. A method for preventing, treating, or ameliorating a medical condition,
 - 15 comprising the step of administering to a mammalian subject a therapeutically effective amount of the polypeptide of claim 5 or the polynucleotide of claim 1.
12. A method of diagnosing a pathological condition or a susceptibility to a pathological condition in a subject comprising:
 - 20 (a) determining the presence or absence of a mutation in the polynucleotide of claim 1; and
 - (b) diagnosing a pathological condition or a susceptibility to a pathological condition based on the presence or absence of said mutation.
13. A method of diagnosing a pathological condition or a susceptibility to a pathological condition in a subject comprising:
 - 25 (a) determining the presence or amount of expression of the polypeptide of claim 5 in a biological sample; and
 - (b) diagnosing a pathological condition or a susceptibility to a pathological condition based on the presence or amount of expression of the polypeptide.
14. A process for making polynucleotide sequences encoding a gene
 - 30 product having altered potassium channel beta subunit activity comprising,
 - a) shuffling a nucleotide sequence of claim 1,
 - b) expressing the resulting shuffled nucleotide sequences and,
 - c) selecting for altered potassium channel beta subunit activity as compared to the potassium channel beta subunit activity of the gene product of said
 - 35 unmodified nucleotide sequence.

- 5 15. A shuffled polynucleotide sequence produced from the process of claim 14.
16. An isolated nucleic acid molecule consisting of a polynucleotide having a nucleotide sequence selected from the group consisting of:
- (a) a polynucleotide encoding a polypeptide of SEQ ID NO:2;
- 10 (b) an isolated polynucleotide consisting of nucleotides 518 to 1798 of SEQ ID NO:1, wherein said nucleotides encode a polypeptide corresponding to amino acids 2 to 428 of SEQ ID NO:2 minus the start codon;
- (c) an isolated polynucleotide consisting of nucleotides 515 to 1798 of SEQ ID NO:1, wherein said nucleotides encode a polypeptide corresponding to amino
- 15 acids 2 to 428 of SEQ ID NO:2 including the start codon;
- (d) a polynucleotide encoding the K+betaM2 polypeptide encoded by the cDNA clone contained in ATCC Deposit No. PTA-2966; and
- (e) a polynucleotide which represents the complimentary sequence (antisense) of SEQ ID NO:41.
- 20 17. The isolated nucleic acid molecule of claim 16, wherein the polynucleotide comprises a nucleotide sequence encoding a human potassium channel beta subunit protein.
18. A recombinant vector comprising the isolated nucleic acid molecule of claim 16.
- 25 19. A recombinant host cell comprising the recombinant vector of claim 18.
20. An isolated polypeptide consisting of an amino acid sequence selected from the group consisting of:
- (a) a polypeptide fragment of SEQ ID NO:2 having potassium channel
- 30 beta subunit activity;
- (b) a polypeptide domain of SEQ ID NO:2 having potassium channel beta subunit activity;
- (c) a full length protein of SEQ ID NO:2;
- (d) a polypeptide corresponding to amino acids 2 to 428 of SEQ ID NO:2,
- 35 wherein said amino acids 2 to 428 comprise a polypeptide of SEQ ID NO:2 minus the start methionine;

5 (e) a polypeptide corresponding to amino acids 1 to 428 of SEQ ID NO:2;
and

(f) a polypeptide encoded by the cDNA contained in ATCC Deposit No.
PTA-2966.

21. The method for preventing, treating, or ameliorating a medical
10 condition of claim 11, wherein the medical condition is a neural disorder related to
memory deficiency.

22. The method for preventing, treating, or ameliorating a medical
condition of claim 11, wherein the medical condition is a neuroendocrine condition
related to aberrant thyroid hormone release.

15 23. The method for preventing, treating, or ameliorating a medical
condition of claim 11, wherein the medical condition is a disorder related to hyper
potassium channel activity.

24. The method for preventing, treating, or ameliorating a medical
condition of claim 11, wherein the medical condition is an immune disorder.

20 25. The method for preventing, treating, or ameliorating a medical
condition of claim 24, wherein the medical condition is an immune disorder related to
aberrant NF-kB activity.

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